POTENTIAL PREDICTORS OF ADEQUATE KNOWLEDGE OF FIRST AID PRINCIPLES AMONG TEXAS HIGH SCHOOL COACHES

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Cynthia J. Wright, B.A.

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POTENTIAL PREDICTORS OF ADEQUATE KNOWLEDGE OF FIRST AID PRINCIPLES AMONG TEXAS HIGH SCHOOL COACHES

Committee Members Approved:

_____
Dr. John Walker, Chair

_____
Dr. Jack Ransone

_____
Dr. Robert Pankey

Approved:

_____
J. Michael Willoughby
Dean of the Graduate College

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ABSTRACT

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SUPERVISING PROFESSOR: JOHN WALKER

The purpose of this study was to identify potential predictors of adequate knowledge of first aid principles applied to the athletic setting among Texas high school (HS) coaches. Participants were 169 HS coaches near Austin, Texas, who participated by filling out a demographic questionnaire and a 27-item First Aid Assessment (FAA) which assessing both first aid and CPR knowledge. Data were analyzed for correlation or group differences between FAA score and demographic data. ANOVA, χ^2, and regression analysis were performed on the data using Statview 5.0.

A significant difference in FAA score was observed between respondents who had taken a course in Care & Prevention course and those who had not. A significant positive correlation existed between years of experience and FAA score ($R = .23$, $p = .002$). However, there was no significant relationship between FAA score and certification in first aid, certification in CPR or undergraduate major. The results of the study indicate that years of experience are the most important factor in predicting coaches' knowledge of first aid principles.

Coaches' overall knowledge of first aid principles was found to be insufficient to adequately safeguard the health of high school athletes, with 30.2% of coaches failing the FAA (score <70%). Results emphasize the importance of employing professionally trained personnel to provide athlete health care. Future research should establish exactly what knowledge is essential for coaches, and investigate alternative training models that more effectively equip coaches with the knowledge needed to act prudently regarding athletic injury or illness.

CHAPTER 1

INTRODUCTION TO THE STUDY

Approximately 7 million high school (HS) students engaged in school sponsored athletic programs in the 2004-2005 academic year (National Federation of State High School Associations, 2005). Currently it is estimated that from 1 in 2 to 1 in 5 student-athletes will sustain a sports related injury (Aukerman, Aukerman, & Browning, 2006; Carek, Dunn, & Hawkins, 1999; Lyznicki, Riggs, & Champion, 1999) and in rare cases, 1 in 100,000 HS athletes, will suffer a catastrophic injury resulting in severe injury, paralysis or even death (Andersen, Courson, Kleiner, & McLoda, 2002; Lyznicki et al., 1999).

Over half of all injuries occur during practice (Powell & Barber-Foss, 1999) where the coach is least likely to have the supporting presence of a team physician or certified athletic trainer (Bell, Prendergast, Schlichting, Mackey, & Mackey, 2005; Lindaman, 1991; Rutherford, Niedfeldt, & Young, 1999; Tonino & Bollier, 2004). In the absence of other qualified healthcare providers, the coach most often assumes the responsibility for providing initial healthcare and making decisions regarding athletes' return to play (Hage & Moore, 1981; Koabel, 1995; Stapleton et al., 1984). In common minor injury situations like sprains, strains and contusions, proper initial care can minimize the extent of injury and prevent excess pain, loss of playing time and possible

future complications (Booher & Thibodeau, 2000; Prentice & Arnheim, 2003; Starkey & Ryan, 2002). In a life-threatening situation, early recognition of the emergency and early CPR can greatly increase the chance of survival (Terry et al., 2001). However, previous research has shown that coaches are under-qualified to make such healthcare decisions, and are influenced in their decision making by game score and athletes' ability level (Flint & Weiss, 1992; Lyznicki et al., 1999; Ransone & Dunn-Bennett, 1999; Rowe & Miller, 1991), creating an unreasonable risk of negative outcomes for the injured HS student-athlete.

To protect athlete safety, several athletic organizations advocate mandatory certification in CPR and first aid for all coaches (Andersen et al., 2002; Shores, 2001); however implementation of their recommendations is sporatic with each state or even district adopting its own policy (State of Texas, 2003; Vangsness et al., 1994). Additionally some research indicates that even mandatory certification may not be sufficient (Ransone & Dunn-Bennett, 1999; Vangsness, Hunt, Uram, & Kerian, 1994). Although California requires all paid coaches to maintain current CPR and first aid certification (Vangsness et al., 1994) only 36% passed the First Aid Assessment administered by Ransone and Dunn-Bennett (1999). Rowe and Robertson (1986) found similar knowledge deficits, with only 27% of coaches meeting the criteria level for overall knowledge in all six of their categories.

Previous research has failed to thoroughly evaluate the knowledge level of high school coaches regarding athletic injury, and in particular to determine the influence of certification or educational background on such knowledge. Furthermore, there is a need to determine potential predictors of adequate knowledge of athletic injuries and proper

treatment among coaches. Only through thorough evaluation can appropriate recommendations for the minimum level of training required of coaches be made.

Purpose of the Study

The purpose of this study is to identify potential predictors of adequate knowledge of first aid principles applied to the athletic setting among Texas high school coaches. This will be accomplished by determining the relationship between knowledge level (as assessed by the First Aid Assessment), the coach's formal educational background (including college major, certifications held, and continuing education classes taken), and the time (in months) since the most recent training in care and prevention of athletic injuries, CPR, and first aid has taken place.

Hypotheses

It is hypothesized that coaches with CPR and first aid training who've also taken a course in care and prevention of athletic injury will perform better on the First Aid Assessment than coaches with CPR and first aid training alone.

It is hypothesized that performance on the First Aid Assessment will have an inverse relationship with the number of months since the coach last completed a course in athletic injury care and prevention.

It is hypothesized that coaches with a degree in physical education, exercise science, or related field will score significantly higher on the knowledge assessments than coaches with a degree in another field.

Operational Definitions

1. Athletic trainer versus certified athletic trainer (ATC)—In the early years of the athletic training profession the title "athletic trainer" was often bestowed on any

person who worked with athletic injuries, regardless of training. National certification (ATC) and state licensure (LAT) have since restricted the title of athletic trainer to persons meeting specific standards and requirements. In this proposal the term athletic trainer will be used in connection with study data that did not specify if the athletic trainer was certified or not, whereas ATC will be used only for Board of Certification nationally certified athletic trainers.

2. Return to play—the point in time when an injured athlete is medically released to return to activity post-injury; the point where it is determine that the chance of re-injury is minimal and is an acceptable risk of participation

Delimitations

This study is delimited to high school coaches in Texas within a 1.5 hours radius of Austin, Texas.

This study is delimited by Texas Education Code 33.086, which states that "A school district employee who serves as the head director of a school marching band or as the head coach or chief sponsor for an extracurricular athletic activity, including cheerleading, sponsored or sanctioned by a school district or the University Interscholastic League must maintain and submit to the district proof of current certification in first aid and cardiopulmonary," (State of Texas, 2003).

This study is delimited by the Constitution and Contest Rules of the University Interscholastic League (UIL), the governing body of athletics in Texas public schools. UIL policy requires that coaches be full-time employees of the district. However, interpretation 29 of this policy makes allowances so that minimum of 15 hours a week is acceptable in specific circumstances (UIL, 2006).

Limitations

This study was limited to participants in central Texas. Therefore, while the results are representative of the central Texas region, caution should be using in generalizing findings to other states or the United States as a whole.

The results of this study were limited by Texas Education Code 33.086, which states requires all head coaches to maintain current CPR and first aid certification. Because of this limitation the percentage of coaches that possess these certifications in Texas may be higher than in other states without similar mandates, and this may have influenced the findings of the study. Caution should be used when making interstate comparisons.

The participants in this study were limited to high school coaches. Caution should be taken in generalizing the results of this to middle school coaches.

Significance of the Study

With approximately 56% of American high school students participating in 1 or more sports teams each year (Center for Disease Control, 2006), the handling of athletic injuries and emergency situations affects a large segment of the population, including parents, athletes, coaches, medical professionals and administrators. The state of Texas, which has the greatest number of high school athletes of any state in the country, requires first aid and CPR certification as the minimum level of training for all head coaches but does not specify the amount of training required of assistant coaches (Texas Education Code 33.086). This study will evaluate whether CPR and first aid certification is a reliable predictor of adequate knowledge of first aid principles among Texas high school coaches. Results could validate Texas law mandating certification of head coaches as the

minimum level of medical training necessary; and encourage the broadening of the statute to apply to all athletic coaches.

In addition this study will track other variables such as college major, years of experience, and completion of a course in care and prevention of athletic injuries, in order to determine the variable or combination of variables that most validly predict the greatest level of competence among high school coaches.

CHAPTER 2

LITERATURE REVIEW

Youth sports participation, specifically at the high school (HS) level has increased enormously in the last several decades (Aukerman, Aukerman, & Browning, 2006; Terry et al., 2001) and there are now approximately seven million HS athletes in America (National Federation of State High School Associations, 2005). In 2005, 56.0% of all HS students played on one or more sports teams (Center for Disease Control, 2006). Growing numbers of athletes participating in increasingly competitive sport activities greatly increases the likelihood of athletic injuries. Currently it is estimated that from 1 in 2 to 1 in 5 student-athletes will sustain a sports related injury (Aukerman et al., 2006; Carek, Dunn, & Hawkins, 1999; Lyznicki, Riggs, & Champion, 1999) and in rare cases, 1 in 100,000 HS athletes, will suffer a catastrophic injury resulting in severe injury, paralysis or even death (Andersen, Courson, Kleiner, & McLoda, 2002; Lyznicki et al., 1999).

Due to the increased overall number of injuries, the increased chance of injury, and the litigious nature of society, concerns about the immediate medical care available for HS athletes have been raised by parents, healthcare professionals, coaches and administrators alike (Hage & Moore, 1981; Lindaman, 1999; Rowe & Miller, 1991;

Shores, 2001; Tonino & Bollier, 2004). In common minor injury situations like sprains, strains and contusions proper initial care can minimize the extent of injury and prevent excess pain, loss of time and future complications (Booher & Thibodeau, 2000; Prentice & Arnheim, 2003; Starkey & Ryan, 2002). In a life-threatening situation early recognition of the emergency and early CPR can greatly increase the chance of survival (Terry et al., 2001).

HS athletic coaches frequently assume responsibility for providing initial injury care to their athletes and make decisions whether an injured athlete can return to play or not (Koabel, 1995; Rowe & Miller, 1991; Stapleton, Tomlinson, Shepard, & Coon, 1984; Stout, 1997). However, research has shown that coaches are under-qualified to make such healthcare decisions, and are influenced in their decision making by game score and athlete ability level (Flint & Weiss, 1992; Lyznicki et al., 1999; Ransone & Dunn-Bennet, 1999; Rowe & Miller, 1991) creating an unreasonable risk of negative outcomes for the HS student-athlete. The National Athletic Trainer's Association (NATA) position statement on emergency planning states that, "Sports medicine professionals, officials and coaches should be trained in automatic external defibrillation, CPR, first aid, and prevention of disease transmission" (Andersen et al., 2002). Yet, coaches consistently fail to meet even this basic standard (Carek et al., 1999; Furney, 1987; Stapleton et al., 1984; Tonino & Bollier, 2004). To better understand the challenges presented to the safety and wellbeing of student-athletes this review of the relevant research literature will focus on injuries in HS athletics, personnel treating HS student athletes, coach's training and concerns with coaches acting as healthcare providers.

Injury in High School Athletics

Of the 55.1% of American HS students participating in one or more sports teams, 37.7% sought medical treatment as a result of participation (Aukerman et al., 2006). This leads to an overall injury rate of 1 in 3, however studies that focus primarily on football injuries have reported rates as high as 1 in 2 whereas controlling for football injury reduces the rate to 1 in 5 (Lyznicki et al., 1999; Powell & Barber-Foss, 1999). If the most conservative estimate is used, 1/5 of the 7 million HS athletes calculates as 1.4 million athletic injuries a year in HS alone. However, the National Federation of State High School Associations survey of athletic participation reported 2 million injuries annually (as cited in Powell & Barber-Foss, 1999). Furthermore, an average of 35% of all in-school injuries are related to athletic activity (Feldman et al., 1983).

Problems with injury tracking

One of the biggest problems with accurately estimating the prevalence of HS athletic injury is that there are currently no federal or state requirements for reporting them (Lyznicki et al., 1999). Therefore current estimates rely on surveys, national organizations with interests in injury tracking, voluntary submission of injury records, and insurance data. Each method has certain restrictions. Insurance data only record injuries that sought medical treatment from a doctor or other billing healthcare provider, thus providing an accurate record of the frequency and type of referred injuries only. HS injury records are only as reliable as the person completing them. At many schools the coach acts as teacher, coach, athletic trainer, and equipment manager simultaneously (Abraham, 1970; Stapleton et al., 1984), thus making the thorough recording of every athletic injury difficult due to time and resource constraints assuming the coach is

properly trained in evaluating injuries to begin with. The National Athletic Trainer's Association (NATA) estimates that 35% of HSs employ a certified athletic trainer (ATC) (Lyznicki et al., 1999). In these schools professional standards require that the ATC maintain a treatment log, recording the type or injury, sport and treatments administered (Board of Certification "*Standards…," 2004*). Provided that all injuries are reported to the athletic trainer, these records can provide a reliable source of injury data.

National organizations focusing on sports safety and injury include the National Center for Sports Safety (NCSS), National Youth Sports Safety Foundation (NYSSF), National Center for Catastrophic Sport Injury (NCCSI), and National Electronic Injury Surveillance System (NEISS). These organizations track statistics relative to their respective missions, which often includes data on injury rates and types. Additionally, the Center for Disease Control tracks athletic participation and injury rates as part of its bi-annual report on youth risk behavior (2006).

Practice versus game

The majority of all athletic injuries occur at practice (Powell, 1987; Powell & Barber-Foss, 1999). Powell (1987) reported that 62% of all football injuries were sustained in practice, with 53% of all major football injuries (defined as time loss of 3+ weeks) and 43% of football injuries requiring surgery occurring during practice. Powell and Barber-Foss reported that an average of 55.5% of reported injuries were sustained during practice sessions. Volleyball had the highest percent of injuries occurring in practice sessions (68.8%), and boy's soccer had the lowest (40.7%). In contrast, practices are the events least likely to have a physician present, with coverage rates ranging from 1-8.1% (Abraham, 1970; Lindaman, 1991; Rutherford, Niedfeldt, & Young, 1999).

Types of injuries

The types of injuries sustained by HS athletes are relevant to proper care because the type and severity of potential injuries should influence the level of medical care available at both practices and competitions. Due to its widespread popularity in the U.S. and relatively high incidence of severe injury, football has been the most frequently studied sport in the HS athletic injury research literature (Culpepper & Morrison, 1987).

Contusions and sprains are the most frequent football injuries (Culpepper & Morrison, 1987; Hoffman & Lyman, 1988; Powell, 1987; Powell & Barber-Foss, 1999). The relative frequency of contusions was reported by Culpepper & Morrison (1987), Hoffman & Lyman (1988) and Powell (1987) as 29.8, 26.6 and 28.8% respectively. Sprains occurred at a rate of 35.7, 21.6 & 28.2% of all football injuries, respectively. The frequency of strains averaged 13.1% in these studies. Together contusions, sprains and strains constitute 60-70% of all HS football injuries. This indicates that the person(s) responsible for the initial care of these injuries should be well trained in basic first aid principles and the management of soft tissue injuries. Additionally, that person must be able to recognize potential complications, for example that strained cervical musculature jeopardizes the cervical spine, thigh contusions can develop into myostitis ossificans, and a sprained ankle returned to competition too soon greatly increases its risk of re-injury and further damage (Booher & Thibodeau, 2000; Prentice & Arnheim, 2003; Starkey & Ryan, 2002).

Fractures or suspected fractures occur at a relative frequency of 6.6-10.2% of all injuries (Culpepper & Morrison, 1987; Hoffman & Lyman, 1988; Powell, 1987; Powell & Barber-Foss, 1999). The person providing first aid for a fracture should be proficient

in immobilizing the athlete and carrying out an emergency action plan (EAP). Neurotrauma, defined by Powell & Barber-Foss (1999) as injury involving the nervous system, for example concussion or spinal injury, had an average prevalence of 8.7% (Hoffman & Lyman, 1988; Powell, 1987; Powell & Barber-Foss, 1999). Neurotrauma can lead to permanent disability, paralysis or death, while mismanagement of a concussion, e.g. returning an athlete to competition while still experiencing concussion symptoms, greatly increases the risk of a negative outcome and unnecessarily jeopardizes athlete safety (Prentice & Arnheim, 2003; Starkey & Ryan, 2002). The assessment and treatment of neurotrauma is outside the scope of practice of a person with basic first aid and CPR training, and should only be undertaken by a physician, certified athletic trainer (ATC) or other trained medical & allied health personnel (Andersen et al., 2002; American Red Cross, 2002; ARC *"Standard…," n.d.*). The role of the first aider is to activate the EAP, stabilize the patient and prevent further harm (ARC, 2002). Overall approximately 9% of HS football injuries involved the head and neck, whereas the knee, ankle and thigh were the most common sites of injury (Culpepper & Morrison, 1987; Hoffman & Lyman, 1988; Powell, 1987; Powell & Barber-Foss, 1999).

Research regarding injuries sustained by HS athletes in sports other than football is limited. Powell & Barber-Foss (1999) published one of the most comprehensive and recent studies of injury type, location and severity. Among their findings was that the average case rate per 100 players (23.3) and the case rate per 1000 athlete exposures (4.0) for 9 boy's & girl's sports was approximately half that for football (see Table 1).

Table 1

Reportable Injuries, Injured Players, and Injury Rates for Selected High School Sports.

	Boys' Sports					Girls' Sports				
	Baseball	Basketball	Football	Soccer	Wrestling	Basketball	Field Hockey	Softball	Soccer	Volleyball
Reportable Injuries	961	1933	10557	1765	2910	1748	510	910	1771	601
Injured players	765	1538	7310	1521	2166	1399	442	795	1442	628
Case rate/100 players	13.2	28.3	50.0	23.4	35.9	28.7	18.2	16.7	31.4	14.2
Case rate/1000 athlete-exposures	2.8	4.8	8.1	4.6	5.6	4.4	3.7	3.5	5.3	1.7

Note. From "Injury patterns in selected high school sports: a review of the 1995-1997 seasons," by J. W. Powell and K. D. Barber-Foss, 1999, *Journal of Athletic Training, 34*(3), p. 281.

The relative frequency of specific injury types stayed fairly consistent across all sports, with general trauma (e.g. contusions, wounds & cramps), sprains and strains accounting for a majority of all injuries (see Table 2). As may be expected the location of injury varied significantly by sport, with baseball and softball experiencing higher percentages of upper extremity injuries whereas basketball and soccer sustained a greater percentage of lower extremity injuries.

Despite the lower overall incidence of injuries, serious injuries such as neurotrauma and fractures still occurred at relative frequencies of 3.3% and 7.0% respectively (see Table 3), further indicating the need for the presence of qualified medical personnel at all sporting events.

Table 2

Percentages of Reported Injuries by Body Category for Selected HS Sports.

	Boys' Sports					Girls' Sports				
	Baseball	Basketball	Football	Soccer	Wrestling	Basketball	Field Hockey	Softball	Soccer	Volleyball
Head/neck/spine	1.9	3.3	13.3	4.1	9.5	4.3	3.1	3.2	4.9	2.9
Face/scalp	8.9	10.0	2.2	4.6	7.0	6.7	13.5	8.0	4.8	1.6
Shoulder/arm	19.7	2.4	12.0	2.4	18.4	2.4	3.1	16.3	1.9	9.4
Forearm/wrist/hand	24.6	11.4	14.2	5.8	14.2	10.3	12.7	22.9	4.5	11.4
Trunk	7.2	7.7	8.6	6.5	11.9	3.4	4.9	5.5	4.5	11.4
Hip/thigh/leg	14.5	14.4	16.7	28.0	5.4	16.8	21.8	18.0	25.8	9.6
Knee	10.5	11.1	15.1	15.1	14.8	15.7	13.7	10.8	19.4	11.1
Ankle/Foot	12.5	39.3	15.9	33.5	7.0	36.4	23.3	14.8	33.5	41.8
Other	0.1	0.4	2.0	0.2	11.7	1.1	3.3	0.5	0.7	0.4

Note. From "Injury patterns in selected high school sports: a review of the 1995-1997 seasons," by J. W. Powell and K. D. Barber-Foss, 1999, *Journal of Athletic Training, 34*(3), p. 282.

Table 3

Percentage of Reported Injuries by Type of Injury.

	Boys' Sports					Girls' Sports				
	Baseball	Basketball	Football	Soccer	Wrestling	Basketball	Field Hockey	Softball	Soccer	Volleyball
General trauma	30.7	24.8	25.2	29.9	20.7	20.3	36.9	27.6	24.9	11.7
Sprains	20.6	44.8	31.7	32.4	28.6	45.2	25.5	23.8	38.7	51.5
Strains	31.2	15.1	21.0	22.8	23.2	17.7	20.2	32.2	22.4	26.4
Fractures	8.8	8.6	7.5	8.5	6.3	6.8	5.9	8.4	5.8	3.7
Musculoskeletal	6.6	2.2	1.8	1.8	2.6	4.0	4.1	3.8	2.3	4.1
Neurotrauma	1.7	2.8	10.3	3.9	5.7	3.6	3.1	3.2	4.6	1.3
General stress	0.3	1.4	2.4	0.7	13.0	2.1	4.1	1.0	1.2	1.3

Note. From "Injury patterns in selected high school sports: a review of the 1995-1997 seasons," by J. W. Powell and K. D. Barber-Foss, 1999, *Journal of Athletic Training, 34*(3), p. 282.

While the majority of athletic injuries are orthopedic (relating to the musculoskeletal system) in nature (Culpepper & Morrison, 1987; Hoffman & Lyman, 1988; Powell, 1987; Powell & Barber-Foss, 1999), other conditions ranging from heat illness to sudden cardiac death can be triggered by athletic activity (Hoffman & Lyman, 1988; Koester, 2001; Powell, 1987). The NCCSI reported 256 fatalities among HS athletes from 1982-2002. Of these deaths, 125 were from cardiac causes (Koester, 2001). The best way to minimize sudden cardiac arrest in athletes is through thorough pre-participation screening (Koester, 2001; Redfearn, 1980). However once a cardiac arrest occurs the proper handling of it (prompt EMS activation, early CPR and early defibrillation) is crucial to the athlete's chance of survival (Terry et al., 2001). For this

reason, the person(s) supervising athletic practices should be competent in CPR, automated external defibrillator use and be familiar with his/her institution's EAP (Aukerman et al., 2006; Terry et al., 2001).

Personnel Treating High School Athletes

The question of who is, and who should be, providing initial healthcare for HS athletes was perhaps first discussed in the research literature by J.N. Abraham in 1970. Abraham found that physician coverage of varsity male sports ranged from 67.3% for football, to 2.2% for lacrosse, with football practice sessions only covered 8.1% of the time. Only 29.4% of the schools had someone other than the coach responsible for athletic injuries when a physician wasn't present.

Since Abraham's original research multiple physicians, coaches, athletic trainers and other professionals concerned for the inconsistent and inadequate provision of medical services to HS athletes have conducted related studies which detail the state of affairs (Bell, Cardinal & Dooley, 1984; Bell, Prendergast, Schlichting, Mackey & Mackey, 2005; Koabel, 1995; Lindaman, 1991; Rowe & Miller, 1991; Rowe & Robertson, 1986; Schrader, 1985; Stout, 1997; Tonino & Bollier, 2004; Wrenn & Ambrose, 1980). Several common themes emerge from this large body of work, although differences in region and year conducted create occasional data conflict. When asked, most schools felt that coverage should be improved, but cited budget and time constraints as the main limiting factors (Bell et al., 1984; Wrenn & Ambrose, 1980). Additionally, virtually every study related to the care of HS athletes asked some version of the question, "Who is responsible for providing primary healthcare to athletes?"

Responses to this question indicate three main providers: physicians, athletic trainers and coaches. The role and extent of involvement of each will be discussed in the following sections.

Team physician

Many high schools have one or more designated team physicians, however since few receive compensation for their services accurate estimates are hard to obtain (Culpepper & Niemann, 1987; Rutherford et al., 1999). As a medical doctor is considered the highest level of healthcare provider, it is often beneficial to have one present at an event where injury may occur since their expertise and authority may be needed. Due to the risk and high level of competence necessary for successful completion of certain tasks, such as relocation of a dislocated joint, these tasks are legally reserved for physicians alone (Prentice & Arnheim, 2003; Starkey & Ryan, 2002). The presence of a team physician is common at home varsity football games, with coverage averaging 62% in several states (Abraham, 1970; Carkek et al., 1999; Lindaman, 1991). However, these numbers do vary by region. Tonino and Bollier (2004) observed Chicago public high schools had only 10.6% of varsity home football games covered by a physician. A similar study in Wisconsin yielded a coverage rate of 45.2% (Rutherford et al., 1999). Coverage for junior varsity or freshman football competitions ranged from only 19% (Lindaman, 1991) to 35.8% (Abraham, 1970).

No sport outside of football reported physician coverage at competitions at a rate greater than 25%, in fact only two Michigan sports (ice hockey and boy's basketball) had greater than 5% coverage (Abraham, 1970; Lindaman, 1991). Fifty-nine percent of

Maryland HSs and 65% of North Carolina HSs had physicians for football only (Aukerman et al., 2006; Wrenn & Ambrose, 1980).

As injury epidemiology has shown, the majority of athletic injuries occur in practice (Lyznicki et al., 1999; Powell & Barber-Foss, 1999). Only 1% of high schools in Michigan (Lindaman, 1991), 7.2% of HSs in Wisconsin (Rutherford et al., 1999) and 8.1% of New York HSs (Abraham, 1970) reported having a physician available onsite for practices. However, these numbers may be misleading because the studies did not define the number or percent of practices where the physician was present. Culpepper and Neimann (1987) recorded that only 35% of Alabama schools had a physician "readily available" during practices for both boy's and girl's athletics but did not define readily available, though it appears to signify having a physician on-call. Similarly 28.4% of Wisconsin schools had a physician available on-call (Lindaman, 1991).

Thus, with the exception of varsity football games, a team physician is available only at a minority of HS athletic competitions and practices. In the absence of a physician someone else must take responsibility for the initial evaluation, treatment and referral of injured athletes. In some cases, that person is an athletic trainer.

Athletic trainers

NATA certified athletic trainers (ATC) are qualified in the prevention, emergency care, recognition, treatment and rehabilitation of athletic injuries (Lyznicki et al., 1999). Data from the NATA shows that 35% of public HSs employ an ATC on either a part time or full time basis (Lyznicki et al., 1999). Studies have shown that the availability of an athletic trainer varies greatly by region and by school size—with larger schools generally employing ATCs at higher rates (Bell et al., 2005; Carek et al., 1999; Stout, 1997).

Rutherford et al. (1999) reported that 87% of HSs had a designated athletic trainer for football, who averaged onsite attendance at 51.9% of practices. Similarly Carek et al. (1999) observed that 82% of North Carolina HSs had an athletic trainer assigned to football, although the percentage of time that person was in actual attendance versus being available in an athletic training room was not given. The results of these studies seem to indicate an increase in ATC availability when compared to the results of studies completed in the 1980s which reported 24% of Alabama HSs (Culpepper & Niemann, 1987), 23.7% of Illinois HSs (Bell et al., 1984) and 15.2 % of Michigan school districts (Ray, 1987) employed AT's. This trend is not without exceptions, however. Tonino and Bollier (2004) discovered that the percent of Chicago public HSs with an athletic trainer decreased from 2.5% in 1980 to 2.1% in 2004.

It is evident from the research literature that the services of an ATC are becoming increasingly available to HS athletes (Carek et al., 1999; Rutherford et al., 1999). ATCs in HSs offer quality emergency and ongoing healthcare services at no direct cost to the athlete (Lyznicki et al., 1999). One advantage of using ATCs as primary healthcare providers is that ATCs (unlike coaches) have been shown to be unbiased in decisions regarding whether to return or withhold an athlete from competition following injury (Flint & Weiss, 1992; Ransone & Dunn-Bennett, 1999), thus safeguarding the athlete. There are clear advantages to employing an ATC as a primary healthcare provider; however, even if every HS employed an ATC, the schedule of HS athletic practices and competitions makes it difficult for a single ATC to attend every event, which leaves certain events uncovered (Hage & Moore, 1981).

Coaches

Coaches are often the only supervising staff member available at athletic practices (Bell et al., 2005; Carek et al., 1999; Tonino & Bollier, 2004). As such coaches routinely make first aid and return to play decisions during practices and, at a slightly lower rate, during games as well (Bell et al., 1984; Flint & Weiss, 1992; Hage & Moore, 1981; Koabel, 1995; Rowe & Robertson, 1986; Stapleton et al., 1984; Tonino & Bollier, 2004; Wren & Ambrose, 1980). Several studies in the 1980s indicated that coaches were functioning as their own athletic trainers (being designated as the person primarily responsible for care and prevention of athletic injuries) 80-93% of the time (Bell et al., 1984; Hage & Moore, 1981; Rowe & Robertson, 1986; Stapleton et al., 1984; Wren & Ambrose, 1980). The findings of Stapleton et al. (1984) are fairly representative in that coaches assumed responsibility for immediate injury care during games 77% of the time and during practices 93% of the time. Hage and Moore (1981), and Stapleton et al. (1984) both found that 60% of coaches had the responsibility of deciding if an athlete could return to play after injury during competitions, creating the possibility for conflicts of interest and compromised athlete safety.

This scenario began to change in late 1980s and early 1990s. Rowe and Miller (1991) reported that only 67% of those responsible for athletic healthcare, treatment and rehab were employed primarily as coaches. Additionally Koabel (1995) reported that 68% of the time the coach was the primary healthcare provider at practices, 65% at competitions. Although still high, this does represent a decrease from 1980's levels. Despite the high incidence of coaches acting as primary healthcare providers for athletes,

only 5% of Koabel's respondents felt that the coach was the most qualified person to fit that role, with a majority (77%) indicating an ATC as the most qualified.

Stout (1997) reported that coaches were still highly likely (average of 68%) to be the primary athletic healthcare provider in Washington state HSs in the B and A size category (student enrollment of 1-400), however AA and AAA HSs (enrollment of 400+) only used coaches as primary healthcare providers 40.4 and 28.4% of the time, respectively. Carek et al. (1999) found that 91.5% of Illinois HSs had at least one designated healthcare provider (either an ATC, school nurse or physician), which indicates a decreasing reliance on coaches. However, the median availability of these providers at practice sessions was only 50%, showing that although coaches are being taken out of the role of primary healthcare provider, they are still being called on to provide first aid and other emergency care to their athletes 50% of the time.

Even if only by default, coaches are providing some level of medical care and making decisions about return to play with enough frequency that their qualifications to do so must come under review (Flint & Weiss, 1992).

High School Coaches' Training

In a 1984 survey, fifty-seven percent of coaches reported being uncomfortable with providing injury management care (Stapleton et al.). Redfearn (1980) reported that only 44% of coaches felt they had the capacity to manage a medical emergency, despite the fact that 28% had experienced a life-threatening situation involving an athlete they were coaching at some point in their career. A study by Ransone and Dunn-Bennett (1999) found that only 36% of surveyed coaches could pass their basic First Aid Assessment developed from the American Red Cross First-Aid certification exam.

Moreover, both Ransone and Dunn-Bennett and Flint and Weiss (1992) recorded an alarming tendency of coaches to make decisions regarding withholding injured athletes from a game based more on the game score and athlete's ability (starter, first substitute or bench player) than on the actual injury.

Only 28 states require education programs in sports first aid and safety for high school coaches (Lyznicki, 1999). In schools where greater than 50% of the coaches reported having CPR and first aid training, many stated that they didn't have the capability of handling a medical emergency, even though 26.9% of them had experienced a situation perceived as life threatening (Culpepper & Niemann, 1987). These data prompt questions about the preparation coaches have to guide them in the injury situations which they so often encounter. Specifically under review should be the educational background, certifications, and medical training of HS coaches.

Formal educational background

One potential source of knowledge for a coach is his/her educational background. It has been estimated that that 40-79% of coaches have a degree in physical education (Redfearn, 1980; Rowe & Robertson, 1986; Schatzle, 1980; Stapleton et al., 1984). Physical education majors typically must take coursework in human anatomy and physiology, exercise physiology, kinesiology and usually a first aid or athletic injury care and prevention course. These classes are intended provide a framework for understanding the underlying structures involved in injury and the proper initial response to athletic injuries. Stapleton et al. (1984) reported that 37% of all interviewed coaches (57% of males, 19% of females) mentioned that formal education (e.g. biology, health,

physiology, anatomy) contributed to their ability to manage athletic injury. Competence was also commonly attributed to a course in care and prevention.

However anywhere from 21-60% of coaches hold a degree in another field or, as may be the case with a walk-on coach, hold no degree at all (Redfearn, 1980; Rowe & Robertson, 1986; Stapleton et al., 1984). In the state of Texas coaches must be at least half-time employees of the district, so while the majority of coaches are degree-holding educators, other district employees are eligible to coach regardless of formal education or lack thereof (UIL, 2006). Some sources attribute the growing number of coaches without a physical education background, particularly in girls' sports, to acute coaching shortages related to Title IX (Aukerman et al., 2006; Brown & Butterfield, 1992). Whatever the reason, there are no guarantees that coaches with degrees in other fields have any formal educational background aiding their ability to manage athletes injuries.

First aid & CPR

According to the NATA all personnel associated with practices, competitions, and strength and conditioning should have current training in automated external defibrillator use, CPR, first aid, and disease prevention (Andersen et al., 2002). Carek et al. (1999) concluded that it only makes sense that since coaches are commonly the only adult supervision present during practice and game activities that they should be well versed in first aid and CPR. Bell et al. (1984) report that as early as 1979 the certification and re-certification of coaches in CPR was listed on the Illinois Governor's task force recommendations. Yet only 28 states require education programs in sports first aid and safety for HS coaches (Lyznicki et al., 1999).

The decision to require CPR and/or first aid certification is often left up to individual HSs and school districts (Bell et al., 2005; Rutherford et al., 1999). For example, while CPR and first aid certification is mandatory for all head coaches in Texas, Austin Independent School District added their own policy that broadened that requirement to all athletic coaches (Denise Vanlandingham, CPR/First aid coordinator for AISD, personal communication, August 19, 2006)). Coaches are required to maintain first aid certification in 31.4% and CPR certification in 22.4% of Wisconsin schools (Rutherford et al., 1999). Results from a study of Illinois HSs indicate that coaches were required to maintain first aid certification in 41% and CPR certification in 36% of HSs (Bell et al., 2005). In Los Angeles HSs 90.7% of paid coaches were certified in CPR and 81.4% in first aid despite regulations requiring all paid coaches in California to have current certification in both (Vangsness, Hunt, Uram, & Kerian, 1994), indicating that even states requiring certification have not achieved the goal of 100% certification.

Estimates on actual coaching certification levels in CPR and first aid vary greatly from approximately 45% (Carek et al., 1999; Furney, 1987; Stapleton et al., 1984) to approximately 85% (Flint & Weiss, 1992; Rowe & Miller, 1991; Tonino & Bollier, 2004). This wide range appears to be a result of regional differences and a tendency for recent studies to report higher certification percentages. Additionally, smaller schools (enrollment 1-245 students) were significantly more likely to have a coach trained in basic life support, including CPR and first aid, than larger schools with enrollments of 1200 or more (Carek et al., 1999; Furney, 1987).

Sports safety and other training

Various training programs and coaching certifications have emerged over the years in an effort to increase knowledge and raise standards regarding athletic healthcare (Brown & Butterfield, 1992; Rice, Schlotfeldt, & Foley, 1985; Shores, 2001). The Athletic Health Care System (AHCS) coaching certification, discussed in Brown and Butterfield (1992), is intended for school wide participation. Among the program components, there is a mandatory 30 hour course on athletic injuries which is mandatory for all coaches and athletic training students. Drawbacks to this program include a high start-up cost and labor intensive implementation. These drawbacks have contributed to a failure to achieve widespread adoption of the AHCS.

The University of Washington developed the Athletic Health Care and Training Program to meet the education and record-keeping needs of Seattle public schools (Rice et al., 1985). One of the key components of this innovative, multifaceted program was a 27-hour course in athletic healthcare principles and practices for coaches, athletic training students and school nurses. Rice et al. studied the effectiveness of this educational course, reporting a mean improvement of 17.53% for coaches from the pretest (mean=55.06%) to posttest (mean=72.59%). These results show that a 27-hour course can greatly increase the knowledge of HS coaches regarding athletic injury.

Perhaps the most feasible certification is the American Red Cross/U.S. Olympic Committee sponsored Sports Safety Training because of its widespread availability and the fact that it includes CPR and first aid certification. This training focuses on “injury to soft tissue, muscle, bones and joints, sudden illness, emergency action plans, and much more” (Shores, 2001) and is strongly advocated by the National Center for Sports Safety

for all youth coaches. According to the American Red Cross (“*Sports…,” n.d.*), Sports Safety Training meets and exceeds the CPR and first aid requirements mandated for coaches by many states.

Concerns with Coaches Acting as Healthcare Providers

Although the general consensus is that coaches should be trained in first aid and CPR (Andersen et al., 2002; Furney, 1987; Shores, 2001), some feel that coaches should not take action that goes beyond the realm of emergency first aid and CPR (Hage & Moore, 1981; Redfearn, 1980). Three main lines of reasoning are typically used to support the limiting of coaches’ role in athletic health care.

Inadequate medical training

While Rowe & Miller (1991) found that 82% of coaches responding to their survey had taken a course in athletic injuries, several studies testing coaches’ knowledge and retention have revealed dismal performance (Ransone & Dunn-Bennett, 1999; Rowe & Miller, 1991; Rowe & Roberston, 1986). Ransone and Dunn-Bennett found that only 36% of surveyed coaches passed the First Aid Assessment. Only 27% of respondents (89% of which were coaches) received a passing grade (70%) in all 6 categories of care assessed by Rowe and Robertson (1986). For example, only 24.4% knew what a strain was, and alarmingly only 43.4% knew that when an athlete complains of paresthesia, loss of strength and inability to move one arm, a fractured cervical vertebrae may be indicated. In a follow-up study 5 years later, Rowe and Miller (1991) found that despite CPR & first aid certification by 83 and 89% of respondents, respectively, coaches’ overall performance on the knowledge assessment was still a failing 67%. There was no

statistically significant difference between average scores in each category between the 2 studies (Rowe & Miller, 1991).

Based on these findings it can be concluded that first aid and CPR certification alone are not enough to guarantee acquisition and retention of information about athletic emergency injury care. Part of the difficulty may lie in the varied educational background of HS coaches. Additionally, although first aid and CPR must be renewed regularly, other essential content areas like human anatomy and physiology or care and prevention may not be updated as regularly, or at all. Stapleton et al. (1984) reported that only 63% of coaches had taken a continuing education course in care and prevention of athletic injuries within the last 5 years. Similarly, Kenny (1987) found that less than 1 in 10 HS coaches had taken a specific sports injury course in the last 3 years. In contrast, the Board of Certification (BOC) for athletic trainers requires 75 hours of continuing education every 3 years (Board of Certification "*Requirements…,"* 2004).

Ethical concerns

The role of a coach may create a conflict of interest when that coach has the responsibility of making decisions regarding injuries (Flint & Weiss, 1992). Flint and Weiss reported that 58% of Oregon HS coaches indicated that the final decision to return an athlete to a game was made by the coach. When given game injury scenarios, these same coaches were found to be significantly more likely to return starters in close games versus already-determined games (defined as winning or losing by 15 points or more). Bench players were most likely to be returned when clearly losing. This bias based on player status and game situation, also recorded by Ransone and Dunn-Bennett (1999),

emphasizes the potential for conflicting interests (such as the pressure to win or pressure to provide playing time) to take precedence over the best medical interest of the athlete.

Legal concerns

It is apparent from rulings such as Kleinknecht vs. Gettysberg College (Andersen et al., 2002) and Jarrett vs. Goodlad (Ray, 1987) that educational institutions have a legal obligation to provide first aid and other emergency services as necessary to students who are injured or become ill during participation in school sponsored athletic activity. A CPR and first aid certified coach can help meet this minimum standard by providing such services as are within their training in the event of an emergency. However, as shown previously, not all coaches are certified in first aid and/or CPR. Additionally, certified coaches must act prudently and stay within their scope of practice. The American Red Cross standard first aid and CPR class is only a 6.5 hour class, and does not qualify a person to evaluate, rehabilitation or release an injured athlete to return to play (American Red Cross, 2002; American Red Cross "*Standard…,"* n.d). These are all functions that coaches often admit to performing as part of their job (Flint & Weiss, 1992; Rowe & Miller, 1991; Stapleton et al., 1984).

The American Association of Health, Physical Education and Recreation (AAHPER) lists characteristics of a prudent coach, which include the following: knowledge of players health status, performance of service only in areas of qualification, no diagnosing or treating of injury, performance of proper acts in the case of injury, and maintaining accurate records of serious injury, along with his/her ensuing actions (Stapleton et al., 1984). Review of these characteristics further confirms that in order to limit the personal and institutional liability the coach should not be the person primarily

responsible for athletic healthcare at their institution, rather the coach should perform service only in areas of qualification (e.g. first aid and CPR), leaving evaluation, treatment and rehabilitation of athletic injury to a physician, ATC or other appropriate allied healthcare professional.

Critique of the Current Literature

Although the current literature covers the topics of injury in HS athletics, the personnel who typically treat HS athletes, the medical training of HS coaches, and several specific concerns over coaches providing healthcare in a very thorough manner, few studies have touched on the effectiveness of first aid and CPR training at improving the decision making skills of coaches regarding athletic injury. Their transferability to the type of injury situations commonly faced by coaches needs to be assessed.

The specific program elements recommended by the Occupational Safety and Health Administration (OSHA) and adhered to by the American Red Cross include 9 types of injury training: shock, bleeding, poisoning, burns, temperature extremes, musculoskeletal injuries, bites and stings, medical emergencies (including heart attack, stroke, asthma attack, diabetes, seizures and pregnancy), and confined spaces (U.S. Department of Labor Occupational Safety & Health Administration, 1991). Musculoskeletal injuries and bleeding constitute only 2/9^{ths} of the content, however research has shown that they account for approximately 90% of athletic injuries (Culpepper & Morrison, 1987; Hoffman & Lyman, 1988; Powell, 1987; Powell & Barber-Foss, 1999). In the rare emergency situation where an athlete begins choking, is knocked unconscious, goes into shock or any other potentially life threatening situation, there is no denying that it is essential for the coach to act promptly and prudently

according to accepted guidelines like those taught in American Red Cross first aid and CPR. Yet, one can not ignore the fact that the majority of injuries are not immediately life threatening (Powell & Barber-Foss, 1999) and first aid courses may not be adequately preparing coaches to manage more frequent injuries, like sprains, strains, contusions, fractures or even neurotrauma.

As coaches have diversified educational backgrounds and varied degrees of experience with athletic injuries (Redfearn, 1980; Stapleton et al., 1984) it is advisable for the safety of the student-athlete that a common denominator be in place, a minimum level of emergency training. While first aid and CPR certification is widely advocated as that minimum level (Andersen et al., 2002), one must ask if such training sufficiently accomplishes all relevant objectives or whether further training in athletic injury care should be required. The high failure rate of CPR and first aid-certified coaches in Ransone and Dunn-Bennett (1999) suggests that a problems lies somewhere in the course content or knowledge acquisition/retention. No research has thoroughly evaluated both the knowledge level and decision making skills of coaches regarding athletic injury—looking for significant differences between coaches based on certification or educational background, and a potential predictor of adequate knowledge and/or prudent decision making.

Summary

Injury epidemiology research demonstrates that approximately 2 million HS athletic injuries occur each year, with injury rates ranging between 1 in 3 (3) and 1 in 5 (Powell, 1987; Powell & Barber-Foss, 1999). Over half of all injuries occur during practice (Powell & Barber-Foss, 1999) where the coach is least likely to have the

supporting presence of a team physician or ATC (Bell et al., 2005; Lindaman, 1991; Rutherford et al., 1999; Tonino & Bollier, 2004). In the absence of other qualified healthcare providers the coach most often assumes the responsibility for providing initial healthcare and making decisions about return to play (Hage & Moore, 1981; Koabel, 1995; Stapleton et al., 1984).

As a way of protecting athlete safety multiple organizations advocate mandatory certification in CPR and first aid for all coaches (Andersen et al., 2002; Shores, 2001). However research shows that this requirement is not entirely sufficient to safeguard athlete health. Although California requires all paid coaches to maintain current CPR and first aid certification (Vangsness et al., 1994) only 36% passed the First Aid Assessment administered by Ransone and Dunn-Bennett (1999). Flint and Weiss (1992) and Ransone and Dunn-Bennett reported that coaches showed significant bias in their RTP decisions based on athlete ability and game status. These results emphasize the need to improve both the knowledge acquisition and decision-making skills of coaches regarding athletic injury. Further research should evaluate the knowledge level and decision making skills of HS coaches regarding athletic injury, analyzing the results for significant differences between coaches based on certification or educational background, potential predictors of adequate knowledge and/or prudent decision making. Only through thorough evaluation can appropriate recommendations for the minimum level of training required of coaches be made.

CHAPTER 3

METHODS

The purpose of this study was to identify potential predictors of adequate knowledge of first aid principles applied to the athletic setting among Texas high school coaches. This was accomplished by determining the relationship between knowledge level (as assessed by the First Aid Assessment), the coach's formal educational background (including college major, certifications held, and continuing education classes taken), and the time (in months) since the most recent CPR and first aid training has taken place.

This chapter discusses the method for collecting and analyzing survey data on the knowledge level and training of high school coaches in the state of Texas.

Subjects

Subjects were Texas high school athletic coaches from randomly selected high schools located within a 1.5 hour radius of Austin, Texas. Subjects included head or assistant coaches of any high school level (varsity, junior varsity, etc.) of a school sanctioned sport. Approval from the Texas State University-San Marcos institution review board was obtained, reference number 05-013517.

Tests and Instruments

Demographic survey

A one-page survey (see appendix A) was developed for this study to obtain information about the subject such as gender, educational background and coaching experience. Additionally, 3 questions address the subject's school situation such as division, and presence or absence of a full-time athletic trainer.

First aid assessment (FAA)

This 27-item questionnaire (see appendix B) was first developed by Ransone and Dunn-Bennett (1999) and modified with permission to decrease the length (originally 38 questions) and to reflect updated medical protocol, specifically the American Red Cross 2005 Guidelines for Emergency Care and Education (American Red Cross Advisory Council on First Aid and Safety, 2005). All questions are based on current American Red Cross Lay Responder CPR and first aid content and exam questions. Validity of the American Red Cross exam questions was established by the American Red Cross. The wording of questions has been changed to reflect the different audience, with the word "athlete" being substituted for "patient" at all occurrences, and all scenarios switched to athletic events.

Game situation data sheet

This 1 page questionnaire (see appendix C) developed by Flint and Weiss (1992) and modified by Ransone and Dunn-Bennett (1999) will be included in each survey packet, for use in a related study.

Procedures

Convenience sampling was used to identify multiple high schools within a 1.5 hour radius of Austin, Texas. Once a school was identified as a potential participant, permission to distribute the survey was sought from an athletic director or athletic trainer employed by the school. The athletic director or athletic trainer was asked to distribute a survey packet to each coach at their high school, and to collect all completed surveys from participating coaches. If the contact person agreed to do these tasks, 1 survey packet per coach was delivered to their HS. The first page (see appendix D) was a letter of introduction and survey completion instructions for the coach. The second item was the Demographic Survey (see appendix A), followed by the First Aid Assessment (see appendix B) and lastly the Game Situation Data Sheet (see appendix C). The Game Situation Data Sheet was not be analyzed for the purposes of this study, but will be used in conjunction with related research. Coaches were asked to return the survey packet back to their athletic director or athletic trainer by October 3rd, 2006, which gave them approximately two weeks to complete the survey from the time of receipt. By October 7th, 2006 the athletic director or athletic trainer then mailed all completed surveys in the pre-paid envelope provided, or contacted the principle investigator to indicate the surveys were ready to be picked up in person. The contact person was encouraged to send a reminder note or email to all coaches at their HS at least once before the due date to encourage participation.

Design and Analysis

The dependent variables in this study were whether the participant passed or failed, and the score (expressed as a percent) on the First Aid Assessment. The

independent variables included the coaches' gender, competitive division, years of experience, sport(s) coached, college major, certifications held (e.g. CPR, first aid), whether they had taken a course in Care and Prevention of athletic injuries and the time (in months) since the most recent training in CPR and first aid had taken place.

Regression analysis was used to determine the degree of association among the variables. The dependent variable was the percent of questions answered correctly on the First Aid Assessment. Continuous independent variables were the years of coaching experience, number of months since the most recent CPR certification, the number of months since most recent first aid certification, and the number of months since completion of a Care and Prevention of athletic injuries course (if taken). Several categorical independent variables were also tested using one-way ANOVAs to determine significant differences among groups. These variables included, gender, sport coached, competitive division, undergraduate major, certification in first aid, certification in CPR, and having taken an undergraduate course in Care and Prevention. College major was split into two general groups, those in physical education, exercise science, or related fields and other non-related majors.

Chi-squared analysis was performed to test for significant relationship between response (correct or incorrect) to each FAA question and whether the participant was certified (or not) in first aid and CPR.

CHAPTER 4

RESULTS

There were 123 male and 46 female (72.8 and 27.2% respectively) coaches who completed the questionnaire. According to the sports coached, there were 90 participants (53%) who reported coaching football as either their primary or secondary sport coached, whereas 79 participants (47%) coached other sports excluding football. According to University Interscholastic League division there were 13, 40, 66, and 50 total responses from divisions 2A, 3A, 4A, & 5A respectively. Sixty-nine percent of participants reported having earned a bachelors degree in physical education, health, kinesiology or exercise science. Table 4 summarizes the diversity within the sample. The sample as a whole averaged a score of 75.51% on the First Aid Assessment (FAA). With 70% set as the minimum passing score, 118 (69.8%) passed and 51 (30.2%) failed the FAA.

Table 5 summarizes the results (mean and standard deviation) of the FAA test and the years experience across the various categories within the sample. One-way ANOVA revealed no significant difference in FAA score between respondents who were certified in first aid versus those uncertified, $F(1,167) = 0.13$, $p = .72$. There was also no significant difference in FAA score between respondents who were certified in CPR versus those uncertified, $F(1,167) = 0.02$, $p = .88$. No significant difference in FAA score

was observed between majors versus non-majors, $F(1,167) = 1.35$, $p = .25$, males versus females, $F(1,167) = 3.42$, $p = .07$, nor football versus non-football respondents, $F(1,167) = 0.13$, $p = .72$.

Table 4

Selected Participant Demographics.

	Number	Percent
	Gender	
Male	123	72.78
Female	46	27.21
	School size	
Class 2A	13	7.69
Class 3A	40	23.67
Class 4A	66	39.05
Class 5A	50	29.59
	Sports coached	
Football	90	53.25
Non-football	79	46.75
	Related field of study	
Yes (major)	117	69.23
No (non-major)	52	30.77
	Performance on FAA	
Pass	118	69.82
Fail	51	30.18

Table 5

Relationship of FAA Scores & Years Experience to Demographic Variables.

	N	FAA % correct		Years experience	
		M	sd	M	sd
Male	123	76.64	12.07	13.96	9.75
Female	46	72.50	15.09	7.09	5.45
All	169	75.51	13.05	12.09	9.29
Major	117	74.73	13.36	13.12	10.10
Non-major	52	77.26	12.26	9.75	6.67
All	169	75.51	13.05	12.09	9.29
First aid certified	155	75.40	13.43	11.63	8.98
Non-FA certified	14	76.71	7.93	17.14	11.49
All	169	75.51	13.05	12.09	9.29
CPR certified	160	75.54	13.33	11.96	9.21
Non-CPR certified	9	74.88	6.80	14.33	11.00
All	169	75.51	13.05	12.09	9.29
Taken C&P Course*	57	70.18*	17.57	10.49	7.81
Never had C&P Course*	112	78.22*	8.94	12.90	9.90
All	169	75.51	13.05	12.09	9.29
Division 2A	13	82.61	5.33	15.00	6.30
Division 3A*	40	64.57*	18.85	8.83	3.15
Division 4A	66	79.45	8.06	13.99	10.65
Division 5A	50	77.22	10.11	11.43	9.47
All	169	75.51	13.05	12.09	9.29
Football coach	90	75.85	14.06	13.26	9.69
Non-football coach	79	75.12	11.88	10.75	8.69
All	169	75.51	13.05	12.09	9.29

Note. FAA=First Aid Assessment.
C&P course=undergraduate Care & Prevention of Athletic Injuries Course

* p<.05 for significant difference

A significant difference in FAA score was observed between respondents who had taken a Care and Prevention course versus those who had no course in Care and Prevention, $F(1,167) = 15.61$, $p = .0001$. Table 2 indicates that the respondents who had

taken a Care and Prevention course (78.2 $\pm$ 8.9) scored an average of 8 points lower on the FAA test than respondents who had no course in Care and Prevention (70.2 $\pm$ 17.6). In addition, a one-way ANOVA revealed significant differences in FAA score among divisions, $F(3,165) = 16.55$, $p < .0001$. Bonferroni/Dunn post-hoc tests indicated that the 3A respondents scored significantly lower than the 2A respondents (Diff. = 18.0, $p < .0001$), the 4A respondents (Diff. = 14.9, $p < .0001$), and the 5A respondents (Diff. = 12.7, $p < .0001$).

Analysis of Variance also revealed no significant difference in FAA score between respondents who were currently certified in first aid versus those who were currently uncertified, $F(1,165) = 1.58$, $p = .211$. There was also no significant difference in FAA score between respondents who were currently certified in CPR versus those currently uncertified, $F(1,165) = 1.32$, $p = .253$. No significant interaction in FAA score was observed between current first aid and CPR certification status $F(1,165) = 0.06$, $p = .801$. Additionally, there were no significant interactions in FAA score between current first aid certification status and gender $F(1,165) = 0.26$, $p = .614$, between current first aid certification status and college major $F(1,165) = 0.01$, $p = .917$, between current first aid certification status and sport (football versus non-football) $F(1,165) = 0.13$, $p = .720$, and between current first aid certification status and division $F(1,161) = 1.55$, $p = .203$. Also, there were no significant interactions in FAA score between current CPR certification status and gender $F(1,165) = 0.96$, $p = .328$, between current CPR certification status and college major $F(1,165) = 0.24$, $p = .624$, between current CPR certification status and sport (football versus non-football) $F(1,165) = 0.06$, $p = .805$, and between current CPR certification status and division $F(1,161) = 1.30$, $p = .277$.

A comparison of the responses on each question to current first aid and/or CPR certification status revealed a significant association between the responses on Question 14 and both current first aid certification (χ^2 = 4.98, = .026) and current CPR certification (χ^2 = 7.69, = .006). Of the 140 respondents who were currently certified in first aid, 135 (96%) answered Question 14 correctly. Of the 29 respondents who were not currently certified in first aid, only 25 (86%) answered Question 14 correctly. Out of all respondents, only 17.2% were not currently certified in first aid, but 44.4% of the incorrect answers on Question 14 came from this group. Of the 146 respondents who were currently certified in CPR, 141 (97%) answered Question 14 correctly. Of the 23 respondents who were not currently certified in first aid, only 19 (83%) answered Question 14 correctly. Out of all respondents, only 13.6% were not currently certified in CPR, but 44.4% of the incorrect answers on Question 14 came from this group. No other questions were associated with current first aid and/or CPR certification status.

Regression analysis revealed no significant correlation between FAA score and the number of months since first Aid certification, $F(1,144) = 1.23$, $p = .27$, or the number of months since CPR certification, $F(1,149) = 0.11$, $p = .74$. A weak, yet significant correlation was observed between FAA score and the number of months since taking a Care and Prevention course, $R = .31$, $F(1,53) = 5.50$, $p = .02$. This relationship is demonstrated in Figure 1. Also, another weak, yet significant correlation was observed between FAA score and the number of years of coaching experience, $R = .23$, $F(1,167) = 9.58$, $p = .002$. A test for non-linearity revealed that the relationship between FAA score and the number of months since taking a Care and Prevention course is linear, and not

quadratic F(1,52) = 0.09, p = .772; however, the relationship between FAA score and years of experience is quadratic F(1,166) = 4.61, p = .033. This relationship is demonstrated in Figure 2.

Tests for homogeneity of intercept indicated that after the variation in years of experience was accounted for, there was no additional variation in FAA score based on gender F (1,166) = 0.83, p = .364, major F (1,166) = 3.05, p = .083, sport F (1,166) = 0.02, p = .959, first aid certification status F (1,166) = 0.12, p = .731, or CPR certification status F (1,166) = 0.17, p = .681. Significantly different intercepts were observed among the different divisions (5A, 4A, etc.) F (1,166) = 4.94, p = .028. A test for homogeneity of slope revealed significantly different slopes among the different divisions as well F (1,166) = 14.64, p = .002.

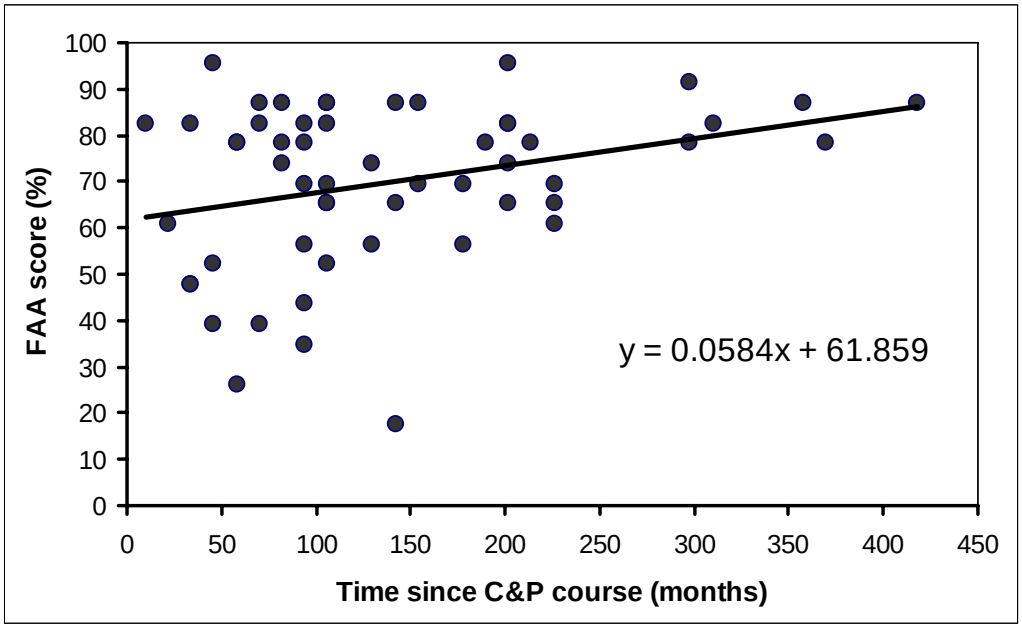

Figure 1. Correlation of FAA scores to time since taking a C&P course.

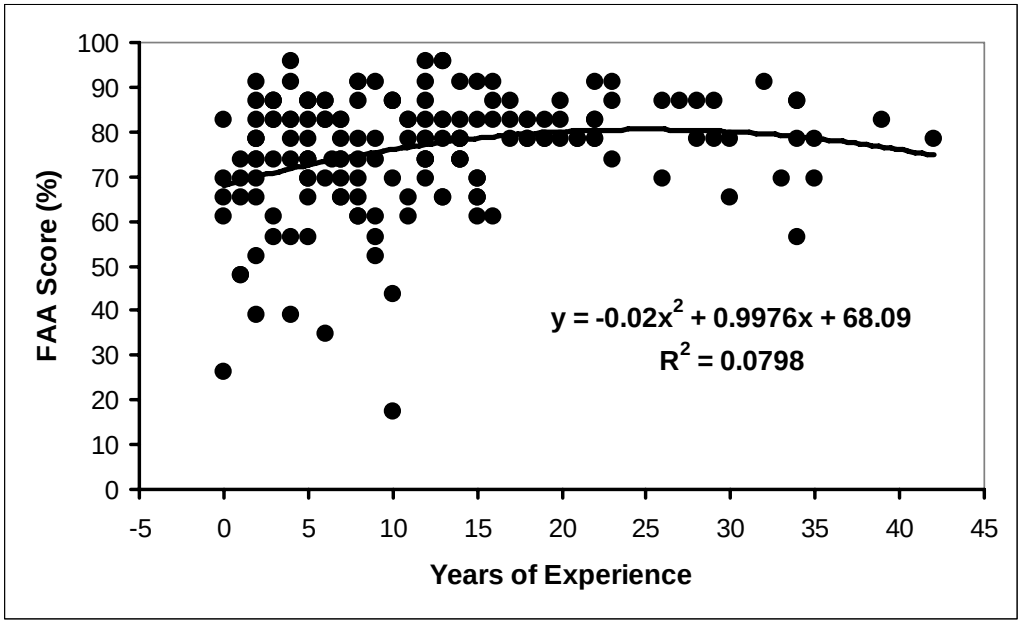

Figure 2. Correlation between FAA score and experience.

CHAPTER 5

DISCUSSION

With approximately 2 million injuries related to high school (HS) athletic participation reported annually (Powell & Barber-Foss, 1999), the quality of medical care provided to student-athletes has received increased scrutiny as evidenced by the large number of studies investigating HS athletic injury and care. The employment of athletic trainers by HSs demonstrates the desire to manage risk, and provide quality injury evaluation and care by a certified medical professional.

However, in many instances coaches are the only supervising staff member present at both practices and games (Bell et al., 2005; Carek et al., 1999; Tonino & Bollier, 2004). As such they are the first to respond to, and evaluate the severity of, an athletic injury at both practices and games (Bell et al., 1984; Flint & Weiss, 1992; Hage & Moore, 1981; Koabel, 1995; Rowe & Robertson, 1986; Stapleton et al., 1984; Tonino & Bollier, 2004; Wren & Ambrose, 1980), and because of this role coaches should have adequate knowledge of first aid principles to act prudently in the case of injury or sudden illness experienced during athletic participation.

Previous research has failed to thoroughly evaluate the knowledge level of high school coaches regarding athletic injury, and in particular to determine the influence of factors such as certification or educational background on such knowledge. Furthermore,

there is a need to determine potential predictors of adequate knowledge of athletic injuries and proper treatment among coaches. Only through thorough evaluation can appropriate recommendations for the minimum level of training required of coaches be made.

Therefore, the purpose of this study was to identify potential predictors of adequate knowledge of first aid principles applied to the athletic setting among Texas high school coaches. It was hypothesized that coaches with CPR and first aid training would score significantly higher on the FAA than coaches without CPR or first aid training. Additionally, it was hypothesized that FAA scores would be significantly higher among coaches with a major in physical education or related field, coaches who's certification is the most recent, and coaches who have taken a course in Care and Prevention of athletic injuries.

The results of the current study demonstrate that less than 70% of coaches in the greater Austin area meet a minimum level of knowledge of first aid principles as assessed by the FAA. This is despite the fact that 94.7 & 91.7% of coaches reported being CPR and first aid certified, respectively. Although it should be noted that according to the self-reported dates only 86.4 & 82.8% could have actually held current CPR and first aid certifications, respectively, even by the longest certification standard. (The American Heart Association grants 2 year certifications in CPR, whereas the American Red Cross's CPR training is only valid for 1 year. Both organizations grant 3 year certifications in first aid.)

These results compare highly to the findings of Rowe and Miller (1991) who found that despite CPR and first aid certification by 83 and 89% of respondents,

respectively, coaches' overall performance on their knowledge assessment was still a failing 67%. It should be noted that Rowe and Miller used a Knowledge Inventory that differed significantly in format, and slightly in content from the FAA used in the current study.

Despite the use of a FAA modified only slightly (to reduce of the number of questions from 38 to 27) from that developed by Ransone and Dunn-Bennett (1999), the results of the current study (69.8% passed) differed greatly from the reported 36% of coaches who passed the FAA in their study. Differences in region, year, methods, or the length of the survey may have influenced the results. Specifically whereas, Ransone and Dunn-Bennett analyzed surveys from all coaches at a small number of schools, the methods of this study led to receipt of an average of 9 completed surveys per school from a much larger number (18) of schools. This difference in sampling may account for part of the increase in scores.

A weak, yet significant correlation was observed between FAA score and the number of months since taking a course in Care and Prevention of Athletic Injuries in college. Although slightly counterintuitive to the logic that a course more recently taken would be fresher in one's memory and thus result in higher scores, the longer since taking the C&P course, the higher the score on the FAA. However, this may be explained by the fact that another significant correlation was found between years of coaching experience and FAA score, indicating that more years of experience results in better performance on the FAA.

After variation in years of experience was accounted for there was no additional variation in FAA score based on variables such as the participant's gender, sport coached,

or undergraduate major. Likewise, and contrary to hypothesized results, certification in first aid made no significant difference in FAA score, nor did certification in CPR. One possible explanation is that the instrument used (the FAA) measured both first aid and CPR knowledge together, which may have lessened its sensitivity. Additionally, although care was taken to maintain the balance of content areas when the overall number of questions was reduced from 38 to 27, instrument sensitivity may have been diminished. Another possible explanation for the lack of significant relationship between FAA score and certification is an increased level of knowledge about the principles of first aid and CPR in the coaching population in general, thus decreasing the effect of knowledge gain from a first aid or CPR course.

A significant difference in FAA score was noted between University Interscholastic League (UIL) divisions. Division 3A scored significantly lower (mean=64.6%) than each of the 3 other divisions (2A, mean=82.6%; 4A, mean=79.5%; and 5A, mean=77.2%). Compared to the participants from divisions 4A and 5A, participants in division 3A were more likely to be from rural areas, although there is insignificant evidence in the current study to suggest a correlation between geographic location and FAA score. Future research should investigate the influence of geographic location and coaches' knowledge of first aid principles.

Chi-squared analysis revealed a significant association between the responses on Question 14 and both current first aid certification. Those with CPR and/or first aid certification where significantly more likely to answer correctly Question 14, which asked the participant the proper course of action if they suspected an athlete was suffering from internal bleeding. No other questions were associated with current first aid and/or

CPR certification status. Of the 5 questions regarding appropriate action once a severe or potentially life-threatening condition has occurred, Question 14 was the only question where calling 911 for help was the only correct answer, whereas the other 4 questions included actions that provided direct treatment to the athlete either before calling 911 or while waiting for help. Knowing when to call 911 is strongly emphasized in both first aid and CPR courses and is knowledge that probably would not be acquired experientially (unless a coach worked at a school with an abnormally high incidence of severe trauma). However, general actions for treatment of an injury or illness condition are more likely to be learned experientially. As already noted, a significant correlation exists between FAA score and years of experience, potentially indicating that many elements of first aid and CPR classes can be learned either from taking a course, experience or some combination of the two.

Taken as a whole this survey raises the question of whether CPR and first aid certification of HS coaches (as mandated by Texas Education Code 33.086) is sufficient to safeguard athlete health. First, only 69.8% of coaches passed the FAA despite current CPR and first aid certification of 86.4 and 82.8% of the sample respectively. This means 30.2% of coaches failed. Secondly, no significant correlation was found between FAA score and whether or not a coach held CPR certification or first aid certification. While these certifications may reduce legal liability, the results of this study indicate that these courses are not effectively increasing the knowledge of coaches regarding the first aid principles they need to act prudently in the case of athletic injury.

Further research should first involve an expert panel which establishes exactly what essential knowledge is for coaches. By developing an accepted set of criteria,

current and future training programs can be assessed more effectively and objectively. Future research should evaluate the effectiveness of alternative modes of increasing coaches' competence regarding initial recognition and treatment of athletic injury or illness until an athletic trainer or other trained medical personnel is available to take over the provision of care.

Future research should evaluate other geographic regions and analyze a larger sample. Additionally, because the results of the current study did not yield strong significant predictors of coaches' knowledge of first aid principles in athletics (as assessed by the FAA), future research should investigate other variables. If CPR and first aid certification is going to continue to be mandated for coaches in many districts and even entire states, then a scientific rationale needs to be established.

APPENDIX A

Demographic Survey

Please provide the following information in the indicated spaces.

1. Sport(s) coached in the 2006-2007 academic year. Please indicate athlete's gender.
   Primary sport: _____
   2nd sport (if any): _____
   3rd sport (if any): _____

2. Years of coaching experience: _____

3. Your gender: M F (circle one)

4. In which division does your primary sport coached compete?
   1A 2A 3A 4A 5A (circle one)

5. Does the high school where you coach:
   a. Have a full time athletic trainer? Y N (circle one)
   b. Have a team physician? Y N (circle one)

6. Educational background:
   a. Do you have a B.S. or B.A.? Y N (circle one)
      i. If yes, what was your major? _____
      ii. If yes, what was your minor (if any)? _____

   b. Do you have certification/training in the following areas:

Type of certification or continuing educational training	**Date (month/year) of most recent certification/completion **if unsure, please estimate****
First aid	
Cardiopulmonary resuscitation (CPR)	
Care and Prevention of athletic injuries course	
Sports Safety Training course	
Emergency medical technician (EMT)	
Certified Athletic Trainer (ATC)	
Texas State licensed athletic trainer	
Other related training/certification:	

APPENDIX B

First Aid Assessment

Please circle the best answer.

1. Ice should always be used _____ after an injury occurs, unless otherwise directed by a physician or athletic trainer.
    a. after the first 48 hours only
    b. during the first 48 hours
    c. during the first 24 hours only
    d. during the first 12 hours only

2. Shock is:
    a. not life-threatening.
    b. possible with all types of injuries.
    c. possible with head and heat-related injuries only.
    d. more likely in chronic injuries.

3. An athlete who is knocked unconscious may return to play if he or she:
    a. regains consciousness within 2 minutes.
    b. presents no signs and symptoms of a head injury.
    c. cleared by a physician.
    d. feels capable of returning to play.

4. Twisting or stretching a joint beyond its normal range of motion is the most common cause of:
    a. sprains.
    b. fractures.
    c. strains.
    d. contusions.

5. Heat stroke can result from:
    a. too little salt.
    b. too high carbohydrates.
    c. dehydration.
    d. hyperhydration.

6. A musculotendinous tissue injury is a:
    a. fracture.
    b. sprain.
    c. strain.
    d. contusion.

7. The greatest danger for an athlete who has mononucleosis is:
    a. seizures.
    b. a punctured liver.
    c. a ruptured spleen.
    d. shock.

8. Standard first aid for a sprained ankle does not include:
    a. ice.
    b. compression.
    c. percussion.
    d. elevation.

9. Characteristics of heat exhaustion include:
    a. slow pulse.
    b. pale, cool, clammy skin.
    c. red, hot, sweaty skin.
    d. bounding pulse.

10. Heat stroke is best prevented by:
    a. limited salt intake.
    b. limited water breaks.
    c. unlimited water intake.
    d. no way to prevent it.

11. You have tried to control bleeding with direct pressure and elevation, but bleeding does not stop. Where would you apply pressure to slow the flow of blood to a wound on the forearm?
    a. Outside of the arm midway between the shoulder and elbow.
    b. On the inside of the elbow.
    c. Inside of the arm midway between the shoulder and elbow.
    d. Any of the above will slow the flow of blood.

12. How can you reduce the risk of disease transmission when caring for open, bleeding wounds?
    a. Wash your hands immediately after giving first aid.
    b. Avoid direct contact with blood and other body fluids.
    c. Use protective barriers such as gloves or plastic wrap.
    d. All of the above.

13. Which is the first step in caring for bleeding wounds?
    a. apply direct pressure on the wound with a clean or sterile dressing.
    b. apply pressure at a pressure point.
    c. Apply bulky dressings to reinforce blood-soaked bandages.
    d. elevate the wound above the level of the heart.

14. What should you do if you think an athlete has internal bleeding?
    a. Apply heat to the injured area.
    b. Call your local emergency phone number for help.
    c. Place the victim in a sitting position.
    d. Give fluids to drink to replace blood loss.

15. Which should be part of your care for a severely bleeding open wound?
    a. Allow the wound to bleed in order to cleanse it and minimize infection.
    b. Apply direct pressure and elevate the injured area, if no broken bones.
    c. Use a tourniquet to stop all blood flow.
    d. Both b and c.

16. After being tackled, an athlete does not get up. The conscious athlete is face down and appears badly hurt. First you send someone for help. Then you:
    a. roll the athlete to his side, in case he starts to vomit.
    b. roll the athlete to his back and elevate the head and chest.
    c. position the athlete so he is in a comfortable position.
    d. have the athlete remain still.

17. Generally, a splint should be:
    a. loose, so that the injured athlete can still move the injured limb.
    b. snug, but not so tight that it slows circulation.
    c. tied with fasteners directly over the injured area.
    d. none of the above.

18. An athlete who is diabetic is drowsy and seems confused. He is not sure if he took his insulin today. What should you do?
    a. Suggest he rest for an hour or so.
    b. Tell him to go take his insulin.
    c. Give him some sugar.
    d. Both a and b.

19. Two soccer players collide on the field. Although there is no visible bleeding, the upper left leg of one player is very red and swelling fast. She probably has what type of wound?
    a. Abrasion.
    b. Bruise.
    c. Strain.
    d. Sprain.

20. What should you do for an athlete who is experiencing heat exhaustion?
    a. Force the athlete to drink lots of cool water.
    b. Get the athlete into a cooler environment.
    c. Have the athlete rest until the feeling passes.
    d. All of the above.

21. An athlete has a severe muscle cramp in the calf. Proper care would be to:
    a. bend the knee and point the toes and foot.
    b. bend the knee and flex toes and foot.
    c. straighten the knee and point the toes and foot.
    d. straighten the knee and flex the toes and foot.

22. An athlete's front teeth are knocked out during practice. The teeth should be:
    a. washed in water and replaced in the sockets.
    b. stored in saline until dentist can replace.
    c. stored in milk until dentist can replace.
    d. any of above is acceptable.

23. An athlete comes to you after being stepped on by an opponent's spikes. The type of injury you suspect is a(n):
    a. abrasion.
    b. puncture.
    c. avulsion.
    d. laceration.

24. At what rate should chest compressions be performed during CPR efforts on an adolescent?
    a. 50 compressions per minute
    b. 80 compressions per minute
    c. 100 compressions per minute
    d. 120 compressions per minute

25. What is the breath (ventilation) to compression ratio when performing CPR on an adolescent?
    a. 12 compressions to 2 ventilations.
    b. 5 compressions to 1 ventilation.
    c. 30 compressions to 2 ventilations.
    d. 10 compressions to 2 ventilations.

26. The first action that should be taken when approaching a collapsed, injured athlete is to:
    a. move the athlete off of playing surface.
    b. determine responsiveness.
    c. check for breathing.
    d. check for pulse.

27. Complications which may occur as a result of external chest compressions when properly performed include:
    a. rib and sternum fractures.
    b. punctured lungs and liver lacerations.
    c. both a and b.
    d. none of the above.

APPENDIX C

Game Situation Data Sheet

Game Situations Data Sheet

Would you return this player to the Game? (Circle Yes or No)

1. During the last 10 minutes in the game with your team clearly losing, your 8th player (usually 3rd into the game) gets a hand in the way of a hard pass and hyperextends an elbow. It is checked and taped. The player is eager to get back on the floor.	Y	N
2. One of your starters, during a game you are winning easily, suffers a dislocated finger. After reduction (being returned to its normal position) the finger is checked for fractures. It doesn't appear as if there are any fractures present. The finger is given some support and the player asks to return to the game.	Y	N
3. One of the bench players, who rarely sees the floor, finally gets a chance to play during a game you are winning easily. After two minutes on the floor the player suffers a hamstring strain. It doesn't appear to be a serious problem after some treatment on the bench. The player is eager to return and shows that the muscle injury only causes a minor limp.	Y	N
4. In a game in which you are only down by 5 points, your starting guard goes down with a sprained ankle. It appears to be a mild sprain and taping has given it some support. The player assures you everything is fine and can perform cuts and turns with only minor discomfort.	Y	N
5. The game is close and your team is down by 4 points. You have a bench player on the floor replacing a tired starter when the bench player begins hyperventilating. After being helped at the bench, the player indicates everything is okay.	Y	N
6. Your team is winning handily when your backup center grabs a rebound, but comes down awkwardly on a teammate's foot. It appears as if the center has a strained achilles tendon. After being checked and a mild strain indicated, taping is used for support. The player appears eager to play again.	Y	N
7. Your starting guard dives after a loose ball and bruises the right kneecap. The game is far out of your team's reach at this point. The knee is slightly stiff and is showing some signs of a bruise, but the player can move fairly well without too much problem. The player indicated a readiness to return to the game.	Y	N
8. With 10 minutes to go in a close game, and your team up by only 3, your starting guard needs a rest. The backup player at that position had been out with a strained lower back muscle. The backup player has been moving around behind the bench and appears fine. It appears to be only a mild strain and isn't causing the player a great deal of problems. The backup player wants to play again in the game.	Y	N
9. In a losing cause, you want to platoon in all 5 of the players who have seen	Y	N

less than 2 minutes in the game. Your 10th player had played very briefly early in the game, but suffered a “groin pull”. The muscle strain appears to be mild and isn’t causing more than some minor discomfort at this point. The player wants a chance to play more in the game.

APPENDIX D

Letter of Introduction

Dear Coach:

You are invited to participate in a study assessing the first aid knowledge and decision making skills among Texas high school coaches.

I am a graduate student at Texas State University at San Marcos in the Health, Physical Education, & Recreation department working on my master's thesis. From my study I hope to find potential predictors of adequate knowledge of first aid principles so that training for high school coaches such as your self can be assessed, improved and athlete safety increased. A second study will use information from the same questionnaires to assess decision making skills.

If you decide to participate, you'll be asked to complete the attached survey. **Completion will take approximately 10 minutes** (if it takes 15 you're thinking too hard). Please complete the survey quickly and to the best of your ability *without* accessing outside resources, such as a textbook or knowledgeable peer.

Please return all the pages together completed to _____

as soon as possible. All surveys must be received by _____

Any information that is obtained in connection with this study and that can be identified with you will remain completely confidential.

If you have any questions, or would like to receive the results of the study once completed, please contact me via email at cw1248@txstate.edu.

Your decision whether or not to participate will not prejudice your future relations with Texas State University—San Marcos. You are under no obligation to participate in the study. By completing and returning the questionnaires you are indicating your willingness to participate and your consent to have the information used for the purposes of the study. You may keep this paper for your own records.

Thank you very much for your consideration,

Cynthia Wright
Graduate student
Texas State University

Dr. John Walker
Thesis Committee Chair

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VITA

Cynthia Joy Wright was born in Renton, Washington on March 24, 1983, the daughter of Andrew and Bertha Wright. She graduated from Enumclaw High School, Enumclaw, Washington, in June 2001 and soon after enrolled at Whitworth College, Spokane, Washington. At Whitworth College Cynthia majored in Athletic Training with a minor in Spanish, graduating summa cum laude in May 2005. In August of 2005 she moved to San Marcos, Texas and began graduate school and employment as a Graduate Assistant Athletic Trainer at Texas State University-San Marcos. Cynthia currently resides with her sister, brother-in-law, niece and nephews. After graduation she plans to seek employment as a collegiate athletic trainer and teacher of athletic training.

Permanent Address: 1401 Stone Rim Loop

Buda, Texas 78610

This thesis was typed by Cynthia Joy Wright.